

What is claimed is:

1. An isolated polypeptide selected from the group consisting of:

(i) an isolated polypeptide comprising an amino acid having at least:

- 5 (a) 70% identity;
- (b) 80% identity;
- (c) 90% identity; or
- (d) 95% identity

to the amino acid sequence of SEQ ID NO:2 or 4 over the entire length of SEQ

10 ID NO:2 or 4;

(ii) an isolated polypeptide comprising the amino acid sequence of SEQ ID NO:2 or 4,

(iii) an isolated polypeptide which is the amino acid sequence of SEQ ID NO:2 or 4, and

(iv) a polypeptide which is encoded by a recombinant polynucleotide comprising the

15 polynucleotide sequence of SEQ ID NO:1 or 3.

2. An isolated polynucleotide selected from the group consisting of:

(i) an isolated polynucleotide comprising a polynucleotide sequence encoding a polypeptide that has at least

- 20 (a) 70% identity;
- (b) 80% identity;
- (c) 90% identity; or
- (d) 95% identity;

25 to the amino acid sequence of SEQ ID NO:2 or 4, over the entire length of SEQ ID NO:2

or 4;

(ii) an isolated polynucleotide comprising a polynucleotide sequence that has at least:

- 30 (a) 70% identity
- (b) 80% identity;
- (c) 90% identity; or
- (d) 95% identity;

over its entire length to a polynucleotide sequence encoding the polypeptide of SEQ ID NO:2 or 4;

(iii) an isolated polynucleotide comprising a nucleotide sequence which has at least:

- (a) 70% identity;
- (b) 80% identity;
- (c) 90% identity; or
- (d) 95% identity;

5 to that of SEQ ID NO: 1 or 3 over the entire length of SEQ ID NO:1 or 3;

(iv) an isolated polynucleotide comprising a nucleotide sequence encoding the polypeptide of SEQ ID NO:2 or 4;

(v) an isolated polynucleotide which is the polynucleotide of SEQ ID NO: 1 or 3;

10 (vi) an isolated polynucleotide obtainable by screening an appropriate library under stringent hybridization conditions with a probe having the sequence of SEQ ID NO: 1 or 3 or a fragment thereof;

(vii) an isolated polynucleotide encoding a mature polypeptide expressed by the MurC gene contained in the *Staphylococcus aureus*; and

15 (viii) a polynucleotide sequence complementary to said isolated polynucleotide of (i), (ii), (iii), (iv), (v), (vi) or (vii).

3. An antibody antigenic to or immunospecific for the polypeptide of claim 1.

4. A method for the treatment of an individual:

20 (i) in need of enhanced activity or expression of the polypeptide of claim 1 comprising the step of:

(a) administering to the individual a therapeutically effective amount of an agonist to said polypeptide; or

(b) providing to the individual an isolated polynucleotide comprising a polynucleotide sequence encoding said polypeptide in a form so as to effect production of said polypeptide activity *in vivo*; or

25 (ii) having need to inhibit activity or expression of the polypeptide of claim 1 comprising:

(a) administering to the individual a therapeutically effective amount of an antagonist to said polypeptide; or

(b) administering to the individual a nucleic acid molecule that inhibits the expression of a polynucleotide sequence encoding said polypeptide; or

- (c) administering to the individual a therapeutically effective amount of a polypeptide that competes with said polypeptide for its ligand, substrate , or receptor.
- 5 5. A process for diagnosing or prognosing a disease or a susceptibility to a disease in an individual related to expression or activity of the polypeptide of claim 1 in an individual comprising the step of:
- (a) determining the presence or absence of a mutation in the nucleotide sequence encoding said polypeptide in the genome of said individual; or
- 10 (b) analyzing for the presence or amount of said polypeptide expression in a sample derived from said individual.
6. A method for screening to identify compounds that activate or that inhibit the function of the polypeptide of claim 1 which comprises a method selected from the group consisting of:
- 15 (a) measuring the binding of a candidate compound to the polypeptide or to the cells or membranes bearing the polypeptide or a fusion protein thereof by means of a label directly or indirectly associated with the candidate compound;
- (b) measuring the binding of a candidate compound to the polypeptide or to the cells or membranes bearing the polypeptide or a fusion protein thereof in the presence of a labeled competitor;
- 20 (c) testing whether the candidate compound results in a signal generated by activation or inhibition of the polypeptide, using detection systems appropriate to the cells or cell membranes bearing the polypeptide;
- (d) mixing a candidate compound with a solution containing a polypeptide of claim 1, to form a mixture, measuring activity of the polypeptide in the mixture, and comparing the activity of the mixture to a standard;
- 25 (e) detecting the effect of a candidate compound on the production of mRNA encoding said polypeptide and said polypeptide in cells, using for instance, an ELISA assay, or
- (f) (1) contacting a composition comprising the polypeptide with the compound to be screened under conditions to permit interaction between the compound and the polypeptide to assess the interaction of a compound, such interaction being associated with a second

component capable of providing a detectable signal in response to the interaction of the polypeptide with the compound; and

(2) determining whether the compound interacts with and activates or inhibits an activity of the polypeptide by detecting the presence or absence of a signal generated from the interaction of the compound with the polypeptide.

5

7. An agonist or an antagonist of the activity or expression polypeptide of claim 1.

8. An expression system comprising a polynucleotide capable of producing a polypeptide of claim 10 1 when said expression system is present in a compatible host cell.

9. A host cell comprising the expression system of claim 8 or a membrane thereof expressing a polypeptide selected from the group consisting of:

15

(i) an isolated polypeptide comprising an amino acid sequence selected from the group having at least:

- (a) 70% identity;
- (b) 80% identity;
- (c) 90% identity; or
- (d) 95% identity

20

to the amino acid sequence of SEQ ID NO:2 or 4 over the entire length of SEQ ID NO:2 or 4;

25

(ii) an isolated polypeptide comprising the amino acid sequence of SEQ ID NO:2 or 4;
(iii) an isolated polypeptide which is the amino acid sequence of SEQ ID NO:2 or 4, and
(iv) a polypeptide which is encoded by a recombinant polynucleotide comprising the polynucleotide sequence of SEQ ID NO:1 or 3.

30

10. A process for producing a polypeptide selected from the group consisting of:

(i) an isolated polypeptide comprising an amino acid sequence selected from the group having at least:

- (a) 70% identity;
- (b) 80% identity;
- (c) 90% identity; or

- (d) 95% identity
to the amino acid sequence of SEQ ID NO:2 or 4 over the entire length of SEQ
ID NO:2 or 4;
- 5 (ii) an isolated polypeptide comprising the amino acid sequence of SEQ ID NO:2 or 4;
 (iii) an isolated polypeptide which is the amino acid sequence of SEQ ID NO:2 or 4, and
 (iv) a polypeptide which is encoded by a recombinant polynucleotide comprising the
polynucleotide sequence of SEQ ID NO:1 or 3,
 comprising the step of culturing a host cell of claim 9 under conditions sufficient for the
production of said polypeptide.
- 10
11. A process for producing a host cell comprising the expression system of claim 8 or a membrane thereof expressing a polypeptide selected from the group consisting of:
- 15 (i) an isolated polypeptide comprising an amino acid sequence selected from the group having at least:
- (a) 70% identity;
 (b) 80% identity;
 (c) 90% identity; or
 (d) 95% identity
 to the amino acid sequence of SEQ ID NO:2 or 4 over the entire length of SEQ
20 ID NO:2 or 4;
 (ii) an isolated polypeptide comprising the amino acid sequence of SEQ ID NO:2 or 4;
 (iii) an isolated polypeptide which is the amino acid sequence of SEQ ID NO:2 or 4, and
 (iv) a polypeptide which is encoded by a recombinant polynucleotide comprising the
polynucleotide sequence of SEQ ID NO:1 or 3,
- 25 said process comprising the step of transforming or transfecting a cell with an expression system comprising a polynucleotide capable of producing said polypeptide of (i), (ii), (iii) or (iv) when said expression system is present in a compatible host cell such the host cell, under appropriate culture conditions, produces said polypeptide of (i), (ii), (iii) or (iv).
- 30 12. A host cell produced by the process of claim 11 or a membrane thereof expressing a polypeptide selected from the group consisting of:

(i) an isolated polypeptide comprising an amino acid sequence selected from the group having at least:

- (a) 70% identity;
- (b) 80% identity;
- 5 (c) 90% identity; or
- (d) 95% identity

to the amino acid sequence of SEQ ID NO:2 or 4 over the entire length of SEQ ID NO:2 or 4;

(ii) an isolated polypeptide comprising the amino acid sequence of SEQ ID NO:2 or 4;

10 (iii) an isolated polypeptide which is the amino acid sequence of SEQ ID NO:2 or 4, and
(iv) a polypeptide which is encoded by a recombinant polynucleotide comprising the polynucleotide sequence of SEQ ID NO:1 or 3.

13. A computer readable medium having stored thereon a member selected from the group
15 consisting of: a polynucleotide comprising the sequence of SEQ ID NO. 1 or 3; a polypeptide comprising the sequence of SEQ ID NO. 2 or 4; a set of polynucleotide sequences wherein at least one of said sequences comprises the sequence of SEQ ID NO. 1 or 3; a set of polypeptide sequences wherein at least one of said sequences comprises the sequence of SEQ ID NO. 2 or 4;
20 a data set representing a polynucleotide sequence comprising the sequence of SEQ ID NO. 1 or 3; a data set representing a polynucleotide sequence encoding a polypeptide sequence comprising the sequence of SEQ ID NO. 2 or 4; a polynucleotide comprising the sequence of SEQ ID NO. 1 or 3; a polypeptide comprising the sequence of SEQ ID NO. 2 or 4; a set of polynucleotide sequences wherein at least one of said sequences comprises the sequence of SEQ ID NO. 1 or 3;
25 a set of polypeptide sequences wherein at least one of said sequences comprises the sequence of SEQ ID NO. 2 or 4; a data set representing a polynucleotide sequence comprising the sequence of SEQ ID NO. 1 or 3; a data set representing a polynucleotide sequence encoding a polypeptide sequence comprising the sequence of SEQ ID NO. 2 or 4.

14. A computer based method for performing homology identification, said method comprising the steps of providing a polynucleotide sequence comprising the sequence of SEQ ID
30 NO. 1 or 3 in a computer readable medium; and comparing said polynucleotide sequence to at least one polynucleotide or polypeptide sequence to identify homology.

15. A further embodiment of the invention provides a computer based method for polynucleotide assembly, said method comprising the steps of: providing a first polynucleotide sequence comprising the sequence of SEQ ID NO. 1 or 3 in a computer readable medium; and
5 screening for at least one overlapping region between said first polynucleotide sequence and a second polynucleotide sequence.

16. An isolated polynucleotide selected from the group consisting of:
(a) an isolated polynucleotide comprising a nucleotide sequence which has at least 70%, 80%,
10 90%, 95%, 97% identity to SEQ ID NO:3 over the entire length of SEQ ID NO:3;
(b) an isolated polynucleotide comprising the polynucleotide of SEQ ID NO:3;
(c) the polynucleotide of SEQ ID NO:3; or
(d) an isolated polynucleotide comprising a nucleotide sequence encoding a polypeptide which has
15 at least 70%, 80%, 90%, 95%, 97, 98, 99 or 99.5% identity to the amino acid sequence of SEQ ID NO:4, over the entire length of SEQ ID NO:4.

17. A polypeptide selected from the group consisting of:
(a) a polypeptide which comprises an amino acid sequence which has at least 70%, 80%, 90%,
10 95%, 97, 98, 99 or 99.5% identity to that of SEQ ID NO:4 over the entire length of SEQ ID NO:4;
(b) a polypeptide which has an amino acid sequence which is at least 70%, 80%, 90%, 95%, 97,
20 98, 99 or 99.5% identity to the amino acid sequence of SEQ ID NO:4 over the entire length of SEQ ID NO:4;
(c) a polypeptide which comprises the amino acid of SEQ ID NO:4;
(d) a polypeptide which is the polypeptide of SEQ ID NO:4;
25 (e) a polypeptide which is encoded by a polynucleotide comprising the sequence contained in SEQ ID NO:3.